

turbofan rotatably disposed in the housing and having one of the above-described features; and a bell mouth provided in the air inlet opening of the housing, wherein an end of the bell mouth is spaced apart from an end of each of portions of the plurality of blades which are disposed in the hub plate.

**[0025]** An inlet end of each of the plurality of blades facing the bell mouth may be provided with a stepped portion.

**[0026]** According to another aspect of the present disclosure, a mold for manufacturing a turbofan may include an upper die and a lower die to form a cavity corresponding to a turbofan for an air conditioning apparatus including one of the above-described features, wherein one of the upper die and the lower die may be provided with a plurality of cores which form the plurality of blades of the turbofan and are separated through the plurality of notches.

**[0027]** Other objects, advantages and salient features of the present disclosure will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses preferred embodiments.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0028]** These and/or other aspects and advantages of the present disclosure will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings of which:

**[0029]** FIG. 1A is a perspective view illustrating a conventional two-dimensional turbofan used in an air conditioning apparatus;

**[0030]** FIG. 1B is a plan view illustrating the two-dimensional turbofan of FIG. 1A;

**[0031]** FIG. 2 is a perspective view illustrating a conventional three-dimensional turbofan used in an air conditioning apparatus;

**[0032]** FIG. 3 is a perspective view illustrating a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure;

**[0033]** FIG. 4 is a rear perspective view illustrating the turbofan for an air conditioning apparatus of FIG. 3;

**[0034]** FIG. 5 is a plan view illustrating the turbofan for an air conditioning apparatus of FIG. 3;

**[0035]** FIG. 6 is a rear view illustrating the turbofan for an air conditioning apparatus of FIG. 3;

**[0036]** FIG. 7 is a cross-sectional view illustrating the turbofan for an air conditioning apparatus of FIG. 5 taken along a line 7-7;

**[0037]** FIG. 8A is a plan view illustrating a blade of the turbofan for an air conditioning apparatus of FIG. 3;

**[0038]** FIG. 8B is a side view illustrating a blade of the turbofan for an air conditioning apparatus of FIG. 3;

**[0039]** FIG. 9 is a view for explaining a relationship between a bell mouth and blades of a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure;

**[0040]** FIG. 10A is a view schematically illustrating a mold for molding a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure;

**[0041]** FIG. 10B is a view schematically illustrating a state in which a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure is mounted to a lower die of FIG. 10A;

**[0042]** FIG. 11 is a perspective view illustrating a ceiling air conditioning apparatus using a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure;

**[0043]** FIG. 12 is a cross-sectional view illustrating the ceiling air conditioning apparatus of FIG. 11 taken along a line 12-12;

**[0044]** FIGS. 13A and 13B are views illustrating a flow of air in blades of a conventional two-dimensional turbofan;

**[0045]** FIGS. 14A and 14B are views illustrating a flow of air in blades of a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure;

**[0046]** FIG. 15 is a graph comparing power consumption of a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure and a conventional two-dimensional turbofan;

**[0047]** FIG. 16 is a graph comparing noise of a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure and a conventional two-dimensional turbofan;

**[0048]** FIG. 17 is a graph comparing static pressure characteristics of a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure and a conventional two-dimensional turbofan; and

**[0049]** FIG. 18 is a graph illustrating noise reduction due to a stepped portion of a blade in a turbofan for an air conditioning apparatus according to an embodiment of the present disclosure.

**[0050]** Throughout the drawings, like reference numerals will be understood to refer to like parts, components and structures.

#### DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

**[0051]** Hereinafter, certain exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

**[0052]** The matters defined herein, such as a detailed construction and elements thereof, are provided to assist in a comprehensive understanding of this description. Thus, it is apparent that exemplary embodiments may be carried out without those defined matters. Also, well-known functions or constructions are omitted to provide a clear and concise description of exemplary embodiments. Further, dimensions of various elements in the accompanying drawings may be arbitrarily increased or decreased for assisting in a comprehensive understanding.

**[0053]** The terms “first”, “second”, etc. may be used to describe diverse components, but the components are not limited by the terms. The terms are only used to distinguish one component from the others.

**[0054]** The terms used in the present application are only used to describe the exemplary embodiments, but are not intended to limit the scope of the disclosure. The singular expression also includes the plural meaning as long as it does not differently mean in the context. In the present application, the terms “include” and “consist of” designate the presence of features, numbers, steps, operations, components, elements, or a combination thereof that are written in the specification, but do not exclude the presence or possibility of addition of one or more other features, numbers, steps, operations, components, elements, or a combination thereof.